SWAMP

Sammamish/Washington Analysis and Modeling Program

SMALL STREAMS TOXICITY / PESTICIDE STUDY 1999

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1. EXECUTIVE SUMMARY

Recent studies have focused attention on the presence of pesticides in storm runoff and surface waters in King County and elsewhere (Davis 1993, Davis 1996, Davis 1998, Davis 2000, Voss and Embrey 2000, Voss et al. 1999). While pesticides have been a concern in the surface waters draining agricultural areas, these studies have shown that small urban and suburban streams can contain high concentrations of a wide variety of pesticides during storm runoff events. This has led to the hypothesis that chemicals applied to lawns and landscapes are consistently making their way into the aquatic environment through non-point runoff. Many of the pesticides present in these urban or suburban streams do not have water quality standards or guidelines. Therefore, knowledge of the presence and concentration of pesticides in streams alone does not provide a full understanding of the ecological consequences of these pesticides to aquatic life in these streams.

The Small Streams Toxicity/Pesticide Study is intended to assess the possible biological implications associated with the presence of pesticides on selected small streams (i.e., Lyon, Juanita, Lewis, and Rock creeks) in King County. This study included analysis of: approximately 150 different pesticides, plus several metals and other contaminants; total organic carbon and total suspended solids; and toxicity using three different test species (*Ceriodaphnia dubia*, *Selenastrum capricornutum,* and *Lemna minor*). Samples were collected during spring storm, summer baseflow, early fall storm, and late fall storm conditions. Additionally, effect threshold levels were identified for all contaminants detected during this study that do not have water quality standards or criteria.

A total of 26 different pesticides and pesticide transformation products were detected in the study streams. Examples of the pesticides detected are the insecticide diazinon and the herbicide 2,4-D. A total of 14 metals were detected, including copper and lead. Pesticide concentrations exceeded effect thresholds or water quality standards ten times, and metal concentrations exceeded these values six times.

Of the 40 water samples collected from the study streams for toxicity testing, ten inhibited growth or reproduction of the test species. Tests conducted on filtered and unfiltered samples indicated that observed toxicity was most often associated with particulates in the test samples; however, occasionally this was not the case, indicating that different toxicants were likely causing the observed toxicity. Toxicity was observed most often in samples collected during storm runoff. In a few cases, pesticides and metals exceeded effect thresholds concurrent with the observation of toxicity in test samples, suggesting specific causative agents. However, in some cases, pesticides and metals exceeded effects thresholds but toxicity was not observed, and in other cases toxicity was observed but no effects thresholds were exceeded. Given this disparity between observed toxicity and exceedance of thresholds, the cause of toxicity observed in these small streams remains largely uncertain. Further study will be needed to determine the specific cause or causes of toxicity observed in study area streams, as well as the ecological significance of the observed toxicity.

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